Save with Solar

Fall 2000 — Vol. 3, No. 2

A technical bulletin for Federal solar energy champions

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U.S. Department of Energy
Federal Energy Management Program

The Sun Shines Bright and Early on Government Roofs

By Patrina Eiffert, Editor, National Renewable Energy Laboratory

This issue of *Save with Solar* recognizes the outstanding contributions of the agencies and individuals who have enabled the government to meet its goal of installing 2,000 solar energy systems on Federal roofs by the year 2000 – and to do so 6 months ahead of schedule. In conjunction with Earth Day 2000 and Soltech, the Federal Renewable Energy Working Group held a special award ceremony in Washington, DC, in April to honor these solar energy champions. They represent the thousands of Federal employees who are working hard to use cleaner energy systems and to improve our environment.

A recent survey by the National Renewable Energy Laboratory (NREL) indicates that more than 2,000 solar and related renewable energy systems are now in place in government facilities, which include everything from modern office buildings, military base housing, laboratories, and schools to visitor centers and ranger stations in the national parks. This achievement represents a Federal investment of more than $10 million in solar energy systems over the past three years. In addition, these projects are offsetting more than 16,000 MBtu of energy from fossil fuels each year and significantly reducing greenhouse gas emissions.

How the goal was met

In Executive Order 13123, President Clinton formally directed Federal agencies to install 2,000 solar systems on the roofs of Government buildings by 2000 and 20,000 systems by 2010 in support of the national Million Solar Roofs Initiative. This initiative was established in 1997 to encourage businesses, communities, and the Government to install solar systems on one million U.S. rooftops by 2010.

The Department of Energy (DOE) leads this initiative by working with partners in the building industry, local and state governments, the solar industry, electricity providers, and others to develop environmentally sound solar energy technologies. The initiative includes two types of solar technologies: photovoltaic systems, which produce electricity when sunlight strikes solar cells, and solar thermal systems, which produce heat for domestic hot water, space heating, and swimming pool heating.

DOE's Federal Energy Management Program (FEMP) coordinates Federal agencies' participation in the Million Solar Roofs Initiative. FEMP helps agencies choose and acquire solar energy systems by providing technical assistance as well as opportunities

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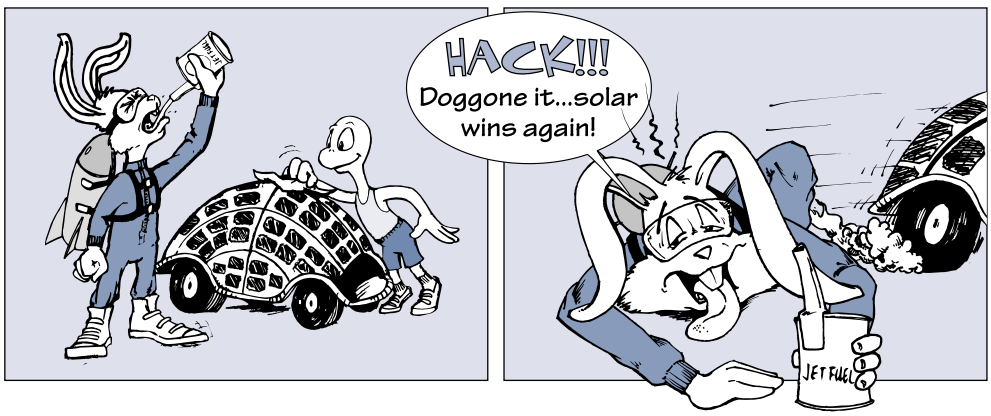

Future competitions between the tortoise and the hare

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Federal Leadership Evident in Year 2000 Achievement

By Anne Sprunt Crawley, Federal Energy Management Program, and Peter Dreyfuss, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy

It is a credit, not just to the Department of Energy, but to all the Federal agencies that have worked so hard to achieve this goal, that more than 2,000 solar systems were installed in Federal facilities six months ahead of schedule. This achievement means we have exceeded the President's call in 1997 for a "down payment" of 2,000 Federal solar roofs by the end of 2000, and 20,000 by the end of 2010, as part of the Million Solar Roofs Initiative.

The individuals and Federal agencies that have made this down payment possible can rest assured that it will help to reduce their conventional energy costs, increase our energy security, and create new jobs. This achievement also serves as a big down payment on a future in which people's health and the environment have priority. By replacing or augmenting conventional energy systems with 2,000 solar systems, agencies are reducing the greenhouse gas emissions associated with traditional energy systems. It is estimated that installing 1,000,000 solar roofs by 2010 will reduce energy-related carbon emissions as much as if we removed at least 850,000 cars from our roadways.

We are pleased to be part of this special issue of *Save with Solar* recognizing the outstanding efforts of the solar energy champions described here, as well as the support and commitment of their home agencies. They also represent hundreds of other Federal, state, and local government employees who are making a very important investment in the future of our nation. The Department of Energy and the Federal Energy Management Program are prepared to continue to do all we can to help the government meet or exceed its solar roofs goal for 2010. Together, through this good work, we are making a difference. ■

Hawaii Electric Light Co./ PIX06857

National Park Sevice Staff in front of a modular, prefabricated portable energy shed, which includes a photovolatic power system with an integrated propone generator, at Ainahou Ranch in Volacanoes National Park in Hawaii. This project was co-funded by DOE FEMP and Hawaii Electric Light Company, Inc.

The Sun Shines Bright and Early

(Continued from p. 1)

to contract with local energy providers. Agencies can also purchase solar and other renewable energy systems directly from the General Services Administration (GSA) supply schedules. GSA works with FEMP to make solar products more readily available. The GSA supply list currently includes both photovoltaic and solar thermal systems.

Who uses solar

Solar thermal systems are the most popular solar technology today; they heat or preheat water by means of dark-colored panels that capture the warmth of the sun. The chief Federal user of solar water heating systems is the U.S. Navy in the Department of Defense. The Navy has been particularly active in installing solar water heaters on the rooftops of base housing, especially in Hawaii. There, abundant sunshine and high utility costs make solar energy a practical choice, and payback periods can be less than 7 years. The Navy has installed more than 1,300 solar systems to date and plans to install at least 300 more by the end of the year.

The next largest Federal solar energy user is the State Department, which has installed more than 360 solar energy systems on government residences overseas. The majority of them are in India, Israel, and Namibia. In addition to solar heating, the government is also deploying state-of the-art building-integrated photovoltaic power systems on facilities like the GSA Williams Building in Boston, Massachusetts. And new photovoltaic systems are in evidence in many of our national parks. Under this initiative, the government has installed more than one-half megawatt of photovoltaic power systems to date.

Other agencies that contributed to the year 2000 milestone are the Departments of Agriculture, Commerce, Energy, Interior, Justice, and Transportation, as well as the Environmental Protection Agency, the Federal Emergency Management Agency, the National Science Foundation, and the United States Postal Service. NASA and the Smithsonian Institution are also developing solar projects to be installed this year. Together, these agencies are helping to reduce atmospheric emissions of greenhouse gases by more than 4,700 tons of carbon dioxide, 13,000 lb of nitrous oxide, and 21,000 lb of sulfur dioxide every year.

What lies ahead

Continuing support for this Initiative will ensure that the year 2010 goal is met, both in government and in the larger community. In the long term, we anticipate that the Million Solar Roofs Initiative will accomplish the following:

Reduce atmospheric greenhouse gases and other emissions. In 2010, with one million solar energy roofs in place, the Initiative could reduce carbon emissions in an amount equivalent to the annual emissions from 850,000 cars.

Create high-technology jobs. By 2010, approximately 70,000 new jobs could be created as a result of the increased demand for photovoltaic energy systems, solar water and space heating, and related energy systems.

Keep the U.S. solar energy industry competitive. By increasing the domestic market for solar energy, spurring domestic production, and reducing the per-unit cost of solar energy systems, the Initiative should enable U.S. companies to retain their competitive edge in world markets. By 2005, the photovoltaic market alone is expected to exceed $1.5 billion worldwide.

The long-term economic, environmental, and energy security benefits of these achievements will be worth every dollar we invest, and more. ■

Million Solar Roofs Initiative Awardees

These individuals and Federal agencies were recognized for their outstanding contributions to the Million Solar Roofs Initiative over the past three years. The Federal agencies are listed alphabetically, and the names of associated awardees follow. And see page 12 for a photo of these solar champions.

Department of Commerce

Awardee: Herman Chan, National Oceanic Atmospheric Administration (herman.chan@noaa.gov)

Thanks in large part to Herman Chan's leadership, the Pacific Tsunami Warning Center in Hawaii has installed passive solar water heaters on six staff residences. These solar water-heating systems were designed to meet at least 90% of the yearly demand for hot water. The systems save between $200 and $300 in energy costs each month, so the simple payback period for the project is only 2.73 years. The annual savings (approximately $3,000) resulting from this solar water heating project will go toward the purchase of much-needed weather radar equipment and satellites, provide funding for research, and help in hiring additional staff.

Patrina Eiffert, NREL/PIX08221

Solar water heaters on staff residences at the Pacific Tsunami Warning Center in Hawaii

Department of Defense

Awardee: Bryan Young, U.S. Air Force (bryan.young@hickam.af.mil)

Bryan Young continually seeks opportunities for innovation. He helped not only his Federal facility but also his community when he installed 21 solar water heaters on military housing units at Hickam Air Force Base in Hawaii. The solar water heaters supply more than 40% of the energy needed to provide hot water to the housing units, saving 92,000 kWh annually. Added to these energy savings are annual carbon emissions savings of more than 27 metric tons. The solar water heaters also provide working examples of renewable energy not only to resident personnel but also to visitors to the base.

Christopher J. Drake/PIX09186

Solar water heater on military housing at Hickam AFB, Hawaii

Awardees: John Campos, COMNAVREG Hawaii, Navy Aloha Center; Alan Ikeda, PACDIV Housing Department (ikedaai@efdpac.navfac.navy.mil); and Eric Kawamoto, PACDIV Utilities, U.S. Navy

The Navy recognizes a winning combination when it sees one. And three leaders in particular are making a difference when it comes to saving energy and reducing pollution on naval bases.High utility costs combined with an excellent solar resource make sites like Moanalua Terrace in Oahu, Hawaii, a perfect location for solar energy, and the Navy housing units located there are now taking full advantage of that potential. The Navy is also making good use of a $1500 per-system rebate offered by the Hawaiian Electric Company. Three detachments (PACDIV Utility, PACDIV Housing, and the Navy Aloha Center) led the effort to install more than 1,000 solar water heating units. Each solar system at Moanalua Terrace offsets about 1.7 tons of carbon dioxide emissions, 8.2 pounds of sulfate emissions, and 11.2 pounds of nitrate emissions each year.

Hawaiian Electric Co., Inc./PIX05573

Solar water heating units at Moanalua Terrace in Oahu, Hawaii

Awardee: Ming Truong, U.S. Navy (mtruong@pwonorva.navy.mil)

Ming Truong has been a leader in several solar energy projects in the Department of Defense, including the installation of a solar pool heating system at the Navy Public Works Center (PWC), solar water heating systems at the Naval Surface Warfare center, and a transpired solar collector at Norfolk Naval Base in Virginia. Ming's support for renewable energy will save the Navy more than $75,000 annually; each year, the system at the PWC saves $23,070, the Norfolk system saves $44,000, and the Naval Surface Warfare systems save more than $8,500. Ming has also worked with the Federal Energy Management Program to ensure receipt of competitive services and expert facility maintenance and management strategies. These efforts not only save money and energy, they also prevent carbon dioxide emissions on the order of 200 million tons annually.

Ming Truong, U.S. Navy/PIX08068

Solar pool heating system at the Navy Public Works Center in Virginia

Awardee: Dick Walsh, U.S. Marines (walshr1@mqg-smtp3.usmc.mil)

Dick Walsh claimed his place at the forefront of energy savings initiatives by championing the installion of new solar water heating collectors at Camp Pendleton. Replacing an older solar system, the new collectors save the Marine Corps approximately 4.5 million Btu per day, for a total of 1,768 million Btu annually. The polymer collectors that replaced the old copper collectors have a 10-year warranty and can withstand the high concentrations of chemicals in the pool water. These energy savings translate to annual cost savings of $10,607 for his facility, and an annual carbon emissions avoidance of nearly 29 million tons.

Sandia National Laboratories/PIX08756

Solar heated swimming pool at Camp Pendleton in Southern California

Department of Energy

Awardee: Bob Parkins, Western Area Power Administration (parkins@wapa.gov)

Bob Parkins played a key role in the effort to install 2-kW prototype photovoltaic (PV) units in each of four Western Area Power Administration regional offices in Arizona, Colorado, Utah, and California. Recognizing the importance of showcasing new renewable energy technologies to help them become more economically viable, Bob had several goals for the prototype installations. The units are cost-effective, saving $7,070 and 17,632 gallons of diesel fuel annually as well as avoiding 5.3 metric tons of carbon emissions every year. However, the value of the prototype systems does not lie entirely in their cost and energy savings performance. These units have high public visibility because of Western's 650-firm utility and Federal agency customer base, and thus they help to educate the public about renewable energy.

PowerLight Corporation/PIX08451

2-kW prototype photovoltaic (PV) unit at Western Area Power Administration facility in California

Awardee: Cherylynne Williams, DOE Headquarters (Cherylynne.Williams@hq.doe.gov)

Cherylynne is responsible for all Forrestal and Germantown photovoltaic projects, including the popular Earth Day Park. The success of the 3-kW system located on the Forrestal building and the upcoming sunwall system will be a direct result of her patience, enthusiasm, and persistence in collaborating with DOE and the District of Columbia, the National Council on Preservation, the Washington Fine Arts Commission, the General Services Administration, and Potomac Electric Power Company (PEPCO) to obtain the permits and permissions needed. Without Cherylynne, these projects either would have been greatly delayed or might not have happened at all.

Byron Stafford, NREL/PIX08133

Sunwall PV system at the Forrestal building in Washington, DC

Department of the Interior

Awardee: Kyril Calsoyas, Working with the Bureau of Indian Affairs (KyrilCalsoyas@excite.com)

Another shining example of the many ways that solar energy can benefit a community was made possible through the work of Kyril Calsoyas. Working with the Bureau of Indian Affairs and Seba Dalkai School in Seba Dalkai, Arizona, Kyril led the effort to install a 4.0-kW building-integrated photovoltaic (BIPV) solar outdoor classroom. In keeping with Navajo building tradition, the installation is designed to be cost effective and efficient, and to complement "hogan" style architecture. Not only will the PV system save on energy costs, it will help to prevent the power blackouts and brownouts common to Seba Dalkai, which cause continual problems for the school's computer-based curriculum. The new school building will serve as both an outdoor classroom and a hands-on laboratory for training in the use of building-integrated photovoltaic energy systems.

Kyril Calsoyas/PIX03409

A 4-kW building-integrated photovoltaic (BIPV) solar outdoor classroom at the Seba Dalkai School in Arizona

Awardee: Bill Coursey, Bureau of Indian Affairs (bill_coursey@mail.bia.gov)

Bill Coursey formed a very special alliance under a DOE Energy Savings Performance Contract to provide renewable energy, energy efficiency, and a unique educational opportunity to the Bureau of Indian Affairs Sherman Indian High School. A 6.9-kW PV system will be connected to the power grid on the school's campus in Riverside, California. The PV system will be used as an educational resource for high school science classes as well as to help train Native Americans employed there in system operation and maintainance. In addition to saving energy and money and reducing any adverse environmental impacts caused by the school, the PV system will provide an opportunity for many people to expand their career horizons into the field of 21st Century renewable energy technologies.

Awardee: Bob McNicols, Bureau of Indian Affairs (Robert_McNicols@ios.doi.gov)

Bob McNicols has led the efforts of the Bureau of Indian Affairs to install three PV systems at Federal facilities in Supai, Arizona. The systems, installed on the Havasupai Indian Reservation, serve the needs of the local community by providing electricity to such facilities as the Havasupai School, a jail, and a government fourplex, which includes housing for teachers and police officials. Utility and maintenance cost savings resulting from the renewable power will be directed to new community and economic development activities. With these projects, Bob has proven the merits of solar energy, not only in terms of energy and cost savings, but in benefits to the community.

Patrinia Eiffert, NREL/PIX07170

PV systems at Federal facilities in Supai, Arizona

Awardee: Trent Duncan, Bureau of Land Management (tduncan@ut.blm.gov)

As a result of the efforts of Trent Duncan, employees of the BLM at eight remote campground field stations are now enjoying the benefits of clean, quiet electrical power. Photovoltaic arrays providing on-site energy were the featured items in a standardized design process to create a comfortable living area for BLM employees from which they could support BLM maintenance, administration, and observation activities in remote areas. Thanks to the new PV energy systems installed in these facilities, BLM staff and remote wildland firefighters alike in Arizona, California, Utah, Idaho, and Alaska will have a more comfortable living environment with fewer adverse environmental impacts. Tourists to the area will also benefit from the increased presence of BLM staff. Because of its versatility, Trent's design will help to ensure a soft footprint, with renewable energy as the core, for new BLM remote field stations for years to come.

Trent Duncan, Bureau of Land Management/PIX07962

Photovoltaic arrays for BLM's on-site energy needs in Arizona, California, Utah, Idaho, and Alaska

Awardee: Harry Remmers, Bureau of Reclamation (Hremmers@do.usbr.gov)

Harry Remmers led a successul effort to improve the energy efficiency of the Leadville, Colorado, Water Treatment Plant. The plant had been heated with eleven 5-kW electric heaters supplemented with a gas-fired makeup air unit. Harry has replaced a good part of this costly and inefficient system with a transpired solar collector, or "solar wall." The solar wall is designed to preheat ventilation air at an efficiency of 70% or more. The project has a payback period of 6.87 years and annual savings of $4,368. The wall will improve air quality indoors and out by preventing 20.07 million tons of carbon emissions. This project will further the mission of the plant to help keep Leadville pristine, and as the Bureau of Reclamation's first transpired solar collector installation, it will serve as a model for similar installations at other facilities owned and operated by the Bureau of Reclamation in 17 western states.

Thomas Bunelle/PIX08357

Transpired solar collector at the Water Treatment Plant in Leadville, Colorado

Awardee: Kent Bullard, National Park Service (Kent_Bullard@nps.gov)

Kent Bullard has demonstrated the environmental leadership that distinguishes the National Park Service by championing several solar energy initiatives at Santa Rosa Island in Channel Island National Park. Kent led the initiative to put photovoltaic arrays on two rooftops in the Santa Rosa housing area; he also spearheaded the effort to install four solar water heating systems on employee residences. His efforts will help protect the fragile marine environment surrounding the park by reducing air pollution and the risk of fuel spills, which can be environmentally and economically disastrous. The two 6.4-kW photovoltaic arrays that were the result of Kent's PV rooftop initiative displaced almost the entire load of the older diesel generator. The 94% reduction in diesel consumption will pay for the installation in just 9 years, and the island's annual energy costs will be reduced from around $38,000 to only about $2,000.

Channel Islands National Park/PIX08545

A 6.4-kW photovoltaic array on Santa Rosa Island, Channel Islands National Park, California

Awardee: Nick Heinrich, National Park Service (Nick_Heinrich@nps.gov)

Nick Heinrich is responsible for the successful installation of a photovoltaic system at Ainahou Ranch, a historic building located in Volcanoes National Park in Hawaii. The facility is used for group retreats and environmental education programs, and its surroundings have been established as a sanctuary for the "nene," or Hawaiian goose. Nick's efforts, which will save the park $4,500 annually, will greatly reduce adverse impacts on the sensitive park environment, which is home to many exotic trees and an extensive potable water cachement and distribution system. The PV system is providing a much cleaner future for the restoration of the ranch than the diesel generator that it has replaced.

Hawaii Electric Light Company/PIX06854

Photovoltaic system at Ainahou Ranch, a historic building located in Volcanoes National Park in Hawaii

Awardee: Joe Martin, National Park Service (Joe_Martin@nps.gov)

Joe Martin has developed a true portfolio of solar energy initiatives for the National Park Service. He has led three efforts recognized by the Million Solar Roofs Initiative: solar water heating systems on seven duplexes and one ranger station at Cape Lookout National Seashore in North Carolina, a photovoltaic system on one of the duplexes, and a photovoltaic system at the Gulf Islands National Seashore in Florida. The installations at Cape Lookout will reduce annual fuel use by more than 1800 gallons. The PV system at Gulf Islands reduces carbon emissions, renders the area more quiet and serene, since there is less need for the noisy diesel generator, and reduces the risk of oil spills, since fuel oil must be transported from the mainland to the islands. Horn Island at Gulf Islands National Seashore in Florida was also a pilot project to encourage Federal procurements of solar energy systems. The new procurement process, offered through the General Services Administration (GSA) supply schedule and the NPS partnership, was fostered by the Federal Energy Management Program.

Applied Power—Lacey/PIX08459

New photovoltaic system at Gulf Islands National Seashore in Florida

Department of Justice

Awardee: DC Hendersen, Bureau of Prisons (phxadm1.dch@bop.gov)

DC Hendersen led the very first successful Federal effort in the nation to install a solar thermal system under an Energy Savings Performance Contract! The parabolic trough system saves $6,000 annually in energy costs and is located at the Federal Correctional Institute near Phoenix, Arizona. The system preheats 50,000 gallons of water daily for use by more then 1,500 inmates and staff. Solar collectors track the sun to heat a circulating stream of propylene glycol antifreeze and water. Heat from the collectors is transferred by copper coils to tanks that store hot water for use in laundry, kitchen, and shower areas. Approximately 90% of the energy cost savings go to the energy services company, Industrial Solar Technologies (IST), under the performance contract to amortize the capital cost of the system and pay for maintenance.

Karen Atkison, NREL/PIX07756

The parabolic trough water-heating system at the Federal Correctional Institute near Phoenix, Arizona

Department of State

Awardees: Richard Crowson, Jane Loyer (loyerjm@state.gov), and Frank Luciani

The Department of State has installed more than 317 solar hot water systems on buildings overseas since the inception of the Million Solar Roofs Initiative. These solar thermal systems are all over the world, in countries such as Senegal, Greece, Tanzania, Cypress, Botswana, Mauritius, Namibia, India, the Bahamas, Egypt, Jordan, Malaysia, Yemen, Indonesia, Chad, Tel Aviv, and Honduras. Many of the solar thermal systems are on government housing, apartments, and office buildings. Richard, Frank and Jane know that the Department of State uses solar energy where it really makes sense!

Department of Transportation

Awardee: Ron Iwao, U.S. Coast Guard (riwao@d14.uscg.mil)

With assistance from the U.S. Coast Guard and the Federal Energy Management Program, Ron Iwao was able to implement a large solar water heating project at the Kia'i Kai Hale housing area in Honolulu, Hawaii. Ron has long been a proponent of renewable energy. He worked tirelessly to convince senior management that solar energy makes economic sense. Hawaii's sunny climate will allow this sizable installation, which includes 62 domestic water heating systems, to save $40,625.38 annually and to avoid more than 69 million tons of carbon emissions each year. Ron also led the effort to fund a project to install 17 solar water heaters on housing facilities on Maui, Kauai, and Hawaii islands; this project has a simple payback of 6.2 years.

Ronald Iwao, U.S. Coast Guard/PIX08775

Large solar water heating project at the Kia'i Kai Hale housing area in Honolulu, Hawaii

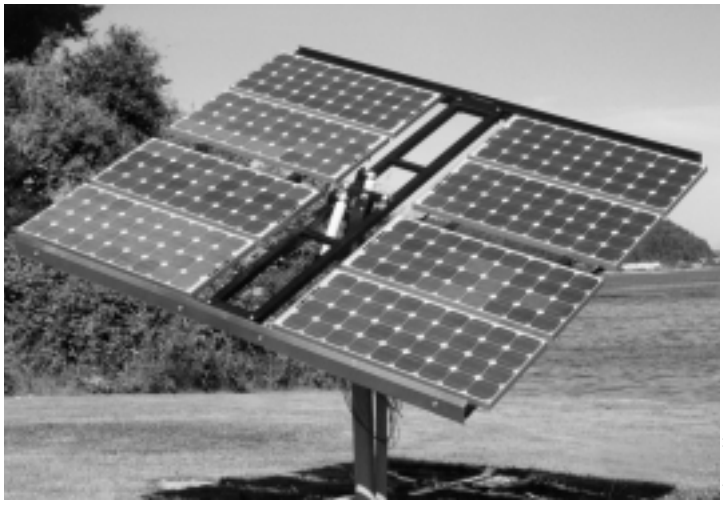
Environmental Protection Agency

Awardee: Sue Datson (Datson.Sue@EPA.gov)

A huge ventilation requirement, and a significantly long heating season, made a winner of Sue Datson's solar wall project at the EPA's Region 8 Hazardous Materials Building. The transpired solar collector or "solar wall" now installed there will maintain the constant-temperature storage conditions needed for the hazardous materials required at the laboratory; it will also cut the monthly heating bill by over 30% by preheating ventilation air for the facility. Sue's effort will reduce natural gas usage by 215 million Btu per year, saving $900 annually on natural gas alone. Avoided emissions are predicted to be 7.4 metric tons of carbon per year.

Awardee: John Grobler (grobler.john@epamail.epa.gov)

John Grobler's successful solar installation at the EPA Region 10 Manchester Laboratory serves many purposes. Not only does the system prevent air pollution and conserve natural resources, it also provides uninterruptible power, which is critically important to the lab. And it is the first net-metered PV system in the Northwest. The installation at the Manchester Lab, completed in June 1999, was inspired by a two-day solar workshop. The 25 workshop participants assembled three tracking PV arrays and their accompanying inverters and battery bank after completing the workshop. PV makes it possible to deliver uninterrupted electrical power, which is crucial to the lab's operation, and it will help to eliminate the use of a diesel generator currently used during power outages, eliminating more than 50,000 tons of carbon emissions annually. John's system has provided a greater awareness of solar options to the EPA and other government entities, and demonstrated the value of photovoltaics in providing high-quality electric power. Government systems also help to demonstrate solar technology and stimulate the solar market, which will drive down future costs.



John Grobler/PIX08411

PV array installation at the EPA Region 10 Manchester Laboratory in the Pacific Northwest

Awardee: Phil Wirdzek (Wirdzek.phil@epa.gov)

In the true spirit of environmental protection, Phil Wirdzek led his agency, the EPA, in an effort to procure a building-integrated photovoltaic roof for its new National Computer Center, to be built in Research Triangle Park, North Carolina. Instead of the standard built-up roofing system, the roof-integrated PV system will displace the cost of conventional roofing materials while providing clean, renewable power and shading the building from the sun. With a total roof area of approximately 35,000 square feet, the peak power output will be around 100 kW AC. The shading and natural ventilation produced by the BIPV system as it allows heated air to rise and move underneath the modules will reduce the building cooling load and allow a reduction in central plant capacity of up to 10 tons. The combination of the clean power provided by the PV roof and its beneficial shading effects are expected to save 872,000 kWh and $71,500 annually. More than 257 metric tons of carbon emissions will be avoided as a result of Phil's efforts.

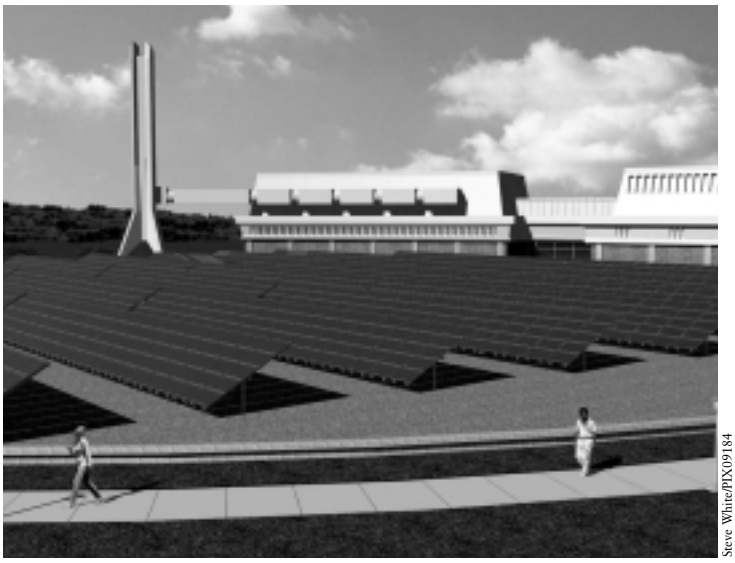
General Services Administration

Awardee: Roman Piaskoski (roman.piaskoski@gsa.gov)

Roman Piaskoski turned a regularly scheduled roof replacement for the GSA into a high-technology installation of building-integrated photovoltaics. As a result, the Williams Building in Boston, Massachusetts, now has a 28-kW AC photovoltaic system consisting of 372 PV panels. Roman recognized the value of building-integrated photovoltaics in its ability to not only produce clean, renewable power, but also to displace conventional building materials. Roman's project includes not only the PV installation but also a replacement of the current district steam heat with gas-fired boilers and a 75-kW co-generation unit. The total project has a projected 10.5-year payback bundled with energy efficiency. This is a great example of how photovoltaics can be successfully integrated into a densely populated urban location.

Awardee: Steve White (steve.white@gsa.gov)

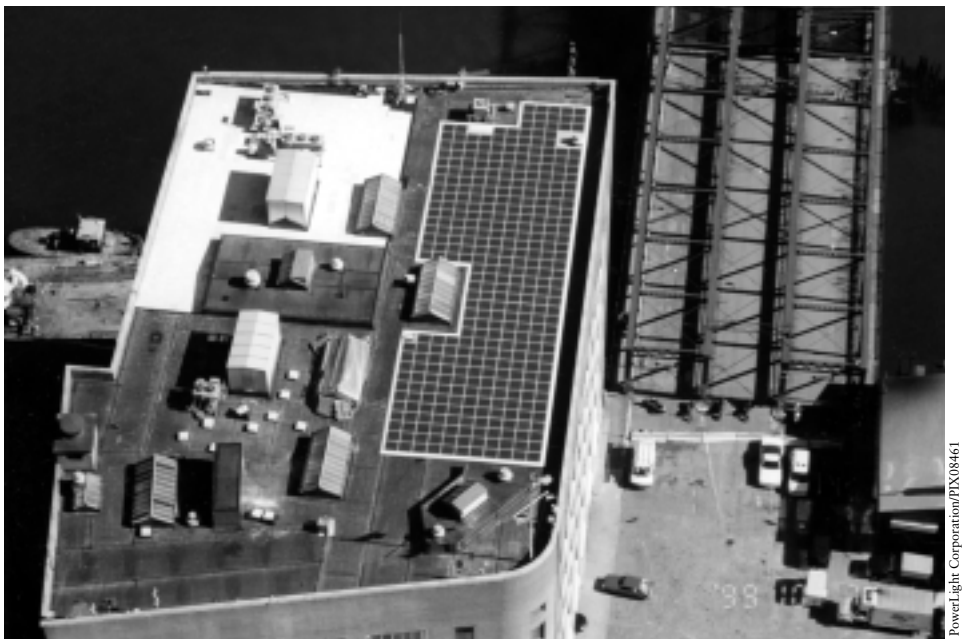
GSA has been building a 100 kW AC photovoltaic array at the Suitland Federal Center, scheduled for completion this year, near Washington, D.C. The project's goals include promoting the use of "green" technologies, enlightening the Federal government and the public about them, and obtaining a low-maintenance, reliable, and attractive PV system. The PV array is built over an abandoned cooling pond. The array consists of 2800 panels assembled on galvanized steel. It will produce 480 V AC and up to 150 amperes. This power will be fed directly into the utility grid without storage.



Steve White/PIX09184

A 100-kW (AC) array at the Suitland Federal Center, near Washington, DC

Roman Piaskoski/PIX07172



PowerLight Corporation/PIX08461

A 28-kW AC photovoltaic system consisting of 372 PV panels at the GSA Williams Building in Boston, Massachusetts

National Science Foundation

Awardee: Frank Brier
(fbrier@nsf.gov)

Antarctica is sometimes known as the untouched land, and Frank Brier is doing his best to preserve that pristine quality. He led an initiative to ensure that a 35 kW building-integrated photovoltaic system will be a prominent feature of the new South Pole station. He is also responsible for the installation of a 1.2 kW photovoltaic system at Lake Hoare, Antarctica. The eight 55 W panels use a manual tracking system to optimize performance and provide power to scientific research facilities at the site. The system includes 1000 amp-hours of deep-cycled gel batteries. In this extreme environment, scientists conducting research must be flown in by helicopter, and they rely on the facilities there to maintain heat and electrical power.

NREL/PIX07612

A 1.2-kW photovoltaic system at Lake Hoare, Antarctica

National Aeronautics and Space Administration

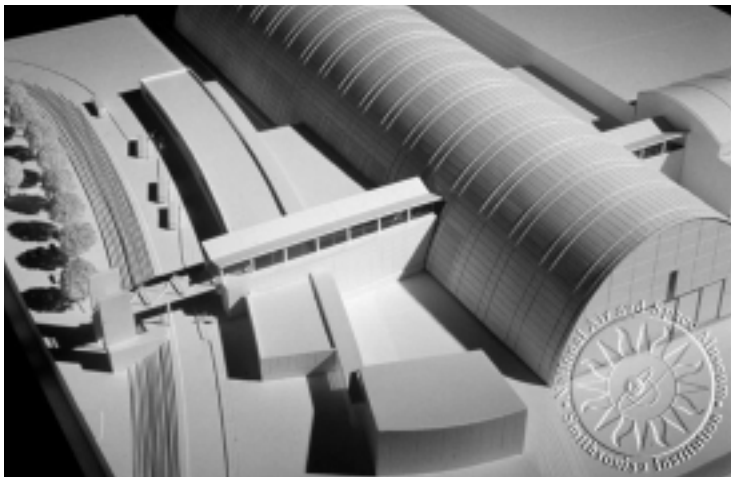
Awardee: Wayne Thalasinos
(Wayne.thalasinos-1@ksc.nasa.gov)

In an effort to reduce the electricity consumption of the film storage facility at NASA's Kennedy Space Center, Wayne Thalasinos championed a successful initiative to utilize a solar thermal preheating unit for the building's ventilation system. Because of the sensitivity of the storage facility's contents, the interior environment must be strictly maintained, and it requires a huge amount of energy to control the temperature and humidity. The solar preheat system will reduce the load on the conventional HVAC system, resulting in an annual savings of 43,813 kWh and $1,402 each year. In addition, the solar preheat system will effectively avoid 12.9 metric tons of carbon emissions annually.

Smithsonian Institution

Awardee: Melinda Humphry Becker
(humphm@opplp.si.edu)

It's hard to decide what word best describes Melinda, a talented Smithsonian architect: "visionary," "driven," or "inexhaustible" ... perhaps all three. Melinda successfully led an effort to secure $1 million in donations from the building-integrated photovoltaics industry for the new National Air and Space Museum's Dulles Center. In essence, this museum will be able to exhibit how photovoltaic systems were fostered in the space program and are now used as a construction material for buildings. In addition, Melinda led the effort to install photovoltaic power systems at Smithsonian facilities in remote sites around Panama. With Melinda's help, the Smithsonian Tropical Research Institute is installing modular 2 kW PV power systems at three of its locations. These systems will help to provide power to the research facilities, which serve both as laboratories and living quarters for personnel.



The new National Air and Space Museum's Dulles Center in Washington, DC

United States Postal Service

Awardees: John Lovgren (Jlovgren@email.usps.gov) and Martin Nelson (mnelson@email.usps.gov)

For several years, the United States Postal Service (USPS) has been working on speeding up its many services, and it isn't wasting any time when it comes to solar power, either. As part of the Million Solar Roofs Initiative (MSRI), the USPS is working with staff at DOE's National Renewable Energy Laboratory (NREL) to develop and implement a strategy to install standardized (virtually off-the-shelf) solar energy systems at USPS facilities. The USPS operates more than 30,000 facilities across the nation.

John Lovgren: John's facility is paying one of the highest utility rates in the country, at more than 28 cents per kWh for the Block Island Post Office's leased building in New Shoreham, Rhode Island. So he decided to install a 6 kW photovoltaic system with a 54 kWh battery backup bank. Block Island is prone to sporadic power failures that tend to wreak havoc on the facility's computer and automation equipment. In addition, John developed an

John Lovgren, U.S. Postal Service/PIX07920

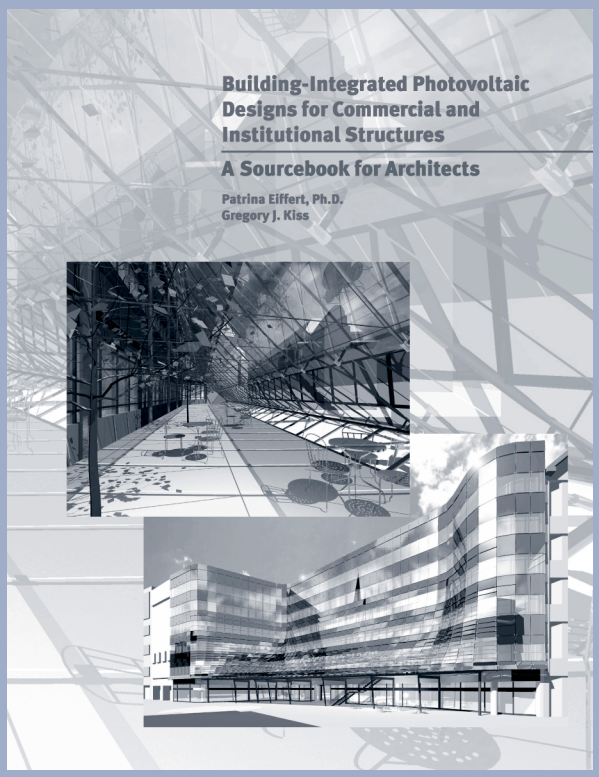
A 6-kW photovoltaic system with a 54-kWh batter y backup bank at the P Post Office in New Shoreham, Rhode Island

educational display unit to educate customers about the renewable energy system.

Martin Nelson: Marty is working with FEMP and NREL to lead the effort to install standardized photovoltaic power systems at multiple sites in California. In addition, Marty took it upon himself to champion the rehabilitation of an inoperable photovoltaic system at the Rancho Mirage Post Office in California. The system was installed in 1987 to directly power DC compressors used for air-conditioning. Then in 1993, the system was modified to provide grid-connected AC power. All the equipment and wiring were in place to provide the power, but there were no connections between the PV panels and the inverters, or between the inverters and the service entrance panel. Working with NREL staff, Marty determined that at relatively little cost, the PV system could be connected to the inverters that are already there to produce 5 kW of AC power. The USPS has been working with the local utility and NREL to get the PV system up and running and connect it to the utility grid. ■

Holly Thomas/PIX07535

Assisting with an inoperatable (PV) power system at Rancho Mirage Post Office in Rancho Mirage



This booklet illustrates the many ways that building-integrated photovoltaic (BIPV) energy systems can be designed as beautifully integrated building components, such as portions of a roof, wall, skylight, or awning. These components function as both a building element and a source of clean, renewable electric power; BIPV is one of the best ways to produce electricity in today's densely populated urban areas.

To request a copy, contact Sheila Hayter, NREL, sheila_hayter@nrel.gov

A Federal Energy Management Program initiative,* You Have the Power *is designed to raise awareness of energy efficiency in the Federal sector. Find out more about it at http://www.eren.doe.gov/femp

Save with Solar

Save with Solar: A Technical Bulletin for Federal Solar Energy Champions

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Production editor: Paula Pitchford
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Illustrator: Jim Leyshon

Produced for the
U.S. Department of Energy (DOE)
Federal Energy Management Program
by the National Renewable Energy
Laboratory, a DOE national laboratory

DOE/GO-102000-1096
September 2000

Printed with a renewable-source ink on paper containing at least 50% wastepaper, including 20% postconsumer waste

DOE/PIX02794

Federal Energy Management Program

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***Federal Solar Energy Champions Recognized:** In conjunction with Earth Day 2000 and Soltech, the Federal Renewable Energy Working Group hosted a special award ceremony in Washington, DC, in April to honor Million Solar Roofs solar energy champions. Federal agencies represented include the U.S. Departments of Commerce, Defense, Energy, the Interior, Justice, State, and Transportation, as well as the Environmental Protection Agency, Federal Emergency Management Agency, General Services Administration, National Science Foundation, NASA, Smithsonian Institution, and United States Postal Service. A recent survey indicated that more than 2,000 solar and related renewable energy systems are now in place in a wide variety of government facilities. See inside for details, including energy and cost savings and important environmental benefits associated with this achievement.* ■